

IN THE CLAIMS:

- 1 1. (Currently Amended) A method for partitioning a pattern into optimized sub-
2 patterns, the method comprising:
 - 3 providing a list of features of the pattern;
 - 4 generating a set of candidate partitions using the list of features of the pattern;
 - 5 scoring each candidate partition of the set of candidate partitions by building sub-
6 patterns using the set of candidate partitions, wherein each candidate partition is scored
7 using a scoring function based on characteristics of a sub-pattern derived therefrom and
8 wherein the characteristics of the sub-pattern includes an overall “suitability” of the sub-
9 pattern used as a search pattern applied to the original pattern wherein the scoring
10 includes analyzing an overall suitability of each sub-pattern;
 - 11 determining a best-scoring partition among the set of candidate partitions;
 - 12 applying the best-scoring partition to the list of features so as to provide a
13 plurality of sub-lists of features respectively representing a plurality of optimized sub-
14 patterns.
- 1 2. (Original) The method of claim 1, wherein providing a list of features includes:
 - 2 using at least one sub-list from the plurality of sub-lists of features generated by
3 an earlier application of the method as the list of features of the pattern.
- 1 3. (Original) The method of claim 1, wherein providing a list of features of the pattern
2 includes:
 - 3 providing an image; and
 - 4 extracting a list of features from the image.
- 1 4. (Original) The method of claim 3, wherein extracting a list of features from the
2 images includes:
 - 3 sampling the image so as to provide a regular array of pixels.

- 1 5. (Original) The method of claim 3, wherein extracting a list of features from the
- 2 images includes:
 - 3 using an edge extraction method to provide an edge image; and
 - 4 sampling the edge image to provide a plurality of edge feature points.
- 1 6. (Original) The method of claim 5, wherein each edge feature point includes the angle
- 2 of the edge at that edge feature point.
- 1 7. (Original) The method of claim 1, wherein features of the pattern are 2D image
- 2 points.
- 1 8. (Original) The method of claim 1, wherein features of the pattern are points of any
- 2 dimensionality.
- 1 9. (Original) The method of claim 1, wherein providing a list of features includes:
 - 2 providing an abstract pattern description; and
 - 3 extracting a list of features from the abstract pattern description.
- 1 10. (Original) The method of claim 1, wherein providing a list of features includes:
 - 2 providing a pre-generated list of features.
- 1 11. (Original) The method of claim 1, wherein generating a set of candidate partitions
- 2 using the list of features of the pattern includes:
 - 3 using a clustering algorithm.
- 1 12. (Original) The method of claim 1, wherein generating a set of candidate partitions
- 2 using the list of features of the pattern includes:
 - 3 using a spatial subdivision algorithm.
- 1 13. (Original) The method of claim 1, wherein generating a set of candidate partitions
- 2 using the list of features of the pattern includes:

3 using a method that yields sub-lists that include pattern features that span an area
4 of the pattern that is spatially small with respect to the area of the entire pattern.

1 14. (Original) The method of claim 1, wherein generating a set of candidate partitions
2 using the list of features of the pattern includes:

3 using a method that provides sub-lists having pattern features that are more near
4 to each other than to pattern features in other sub-lists.

1 15. (Original) The method of claim 1, wherein generating a set of candidate partitions
2 using the list of features of the pattern includes:

3 building a weighted graph using the list of features of the pattern; and
4 partitioning the weighted graph to generate candidate partitions.

1 16. (Original) The method of claim 15, wherein building a weighted graph using the list
2 of features of the pattern includes:

3 fully connecting the feature points to make a graph; and
4 setting the weights on each link.

1 17. (Original) The method of claim 15, wherein building a weighted graph using the list
2 of features of the pattern includes:

3 sparsely connecting the feature points to make a graph; and
4 setting the weights on each link.

1 18. (Original) The method of claim 16, wherein the weights on each link are based on
2 the distance between each pair of feature points.

1 19. (Original) The method of claim 18, wherein weights decrease as the distance
2 between feature points increases.

1 20. (Original) The method of claim 16, wherein the weights on each link are based on at
2 least one of similarity of angle and similarity of magnitude.

1 21. (Original) The method of claim 16, wherein the weights on each link are based on
2 values associated with the feature points of the pattern.

1 22. (Original) The method of claim 16, wherein the weights on each link are determined
2 such that:

3 larger weights represent a pair of features that tend to be together in the same sub-
4 lists of features; and

5 smaller weights indicate a pair of features that can be included in different sub-
6 lists of features.

1 23. (Original) The method of claim 15, wherein partitioning the weighted graph to
2 generate candidate partitions includes:

3 dividing the weighted graph into two sub-graphs, one of which may be empty;
4 and

5 converting the two sub-graphs into two sub-lists of features.

1 24. (Original) The method of claim 15, wherein partitioning the weighted graph to
2 generate candidate partitions includes:

3 partitioning the weighted graph using a “normalized cut” method to generate
4 candidate partitions.

1 25. (Original) The method of claim 1, wherein in generating a set of candidate partitions
2 using the list of features of the pattern, at least one candidate partition has only a single
3 sub-list of features of the pattern.

1 26. (Original) The method of claim 1, wherein in generating a set of candidate partitions
2 using the list of features of the pattern, each candidate partition has many sub-lists of
3 features of the pattern.

1 27. (Original) The method of claim 1, wherein in generating a set of candidate partitions
2 using the list of features of the pattern, some features included in the list of features of the
3 pattern do not appear on any sub-list of features of the pattern.

1 28. (Original) The method of claim 1, wherein in generating a set of candidate partitions
2 using the list of features of the pattern, at least one feature of the pattern appears on a
3 plurality of sub-lists of features of the pattern.

1 29. (Cancelled)

1 30. (Currently Amended) The method of claim 29 1, wherein characteristics of the
2 sub-pattern includes:
3 spatial coherence of the features corresponding to the sub-pattern.

1 31. (Currently Amended) The method of claim 29 1, wherein characteristics of the
2 sub-pattern includes:
3 overall spatial size of the area spanned by the feature points corresponding to the
4 sub-pattern.

1 32. (Original) The method of claim 31, wherein the area spanned by the feature points is
2 represented by the smallest bounding box that includes all the feature points.

1 33. (Currently Amended) The method of claim 29 1, wherein characteristics of the
2 sub-pattern includes:
3 the number of feature points in the sub-pattern.

1 34. (Currently Amended) The method of claim 29 1, wherein characteristics of the
2 sub-pattern includes:
3 the total amount of weight in links "cut" by the partition algorithm to create the
4 sub-pattern.

- 1 35. (Cancelled)
- 1 36. (Currently Amended) The method of claim 29 1, wherein characteristics of the
2 sub-pattern includes:
 - 3 spatial coherence of the features corresponding to the sub-pattern;
 - 4 overall spatial size of the area spanned by the feature points corresponding to the
5 sub-pattern;
 - 6 the number of feature points in the sub-pattern;
 - 7 the total amount of weight in links "cut" by the partition algorithm to create the
8 sub-pattern; and
 - 9 the overall "suitability" of the sub-pattern used as a search pattern applied to the
10 original pattern.
- 1 37. (Currently Amended) The method of claim 35 1, wherein the overall "suitability"
2 of the sub-pattern used as a search pattern applied to the original pattern depends on:
 - 3 the search algorithm used.
- 1 38. (Currently Amended) The method of claim 35 1, wherein the overall "suitability"
2 of the sub-pattern used as a search pattern applied to the original pattern depends on:
 - 3 degeneracy of the features of a sub-pattern.
- 1 39. (Original) The method of claim 35 1, wherein the overall "suitability" of the sub-
2 pattern used as a search pattern applied to the original pattern depends on:
 - 3 redundancy of the sub-pattern within the original pattern.
- 1 40. (Original) The method of claim 1, wherein determining a best-scoring partition
2 among the set of candidate partitions includes:
 - 3 using a partition score threshold.
- 1 41. (Original) The method of claim 40, wherein the partition score threshold is settable.

- 1 42. (Original) The method of claim 40, wherein the partition score threshold is
- 2 predetermined.

- 1 43. (Original) The method of claim 40, wherein the partition score threshold includes a
- 2 portion that is predetermined, and a portion that is settable.

- 1 44. (Original) The method of claim 40, wherein if no candidate partition has a score
- 2 above the partition score threshold, then the list of features of the candidate partition is
- 3 deemed to be one that cannot be usefully sub-divided.

- 1 45. (Cancelled)

- 1 46. (Currently Amended) A method for dividing a pattern into a plurality of sub-
- 2 patterns, each sub-pattern being adapted for use with an image search method that can
- 3 provide a plurality of sub-pattern search results, the method comprising:
 - 4 representing the pattern as a plurality of feature points;
 - 5 generating candidate partitions of the plurality of feature points;
 - 6 scoring the candidate partitions by examining characteristics of each potential
 - 7 sub-pattern of each candidate partition, ~~wherein the characteristics of each potential sub-~~
 - ~~pattern comprises a suitability of the sub-pattern used as a search pattern applied to the~~
 - ~~pattern, wherein each candidate partition is scored using a scoring function based on~~
 - ~~characteristics of a sub-pattern derived therefrom and wherein the characteristics of the~~
 - ~~sub-pattern includes an overall "suitability" of the sub-pattern used as a search pattern~~
 - ~~applied to the original pattern;~~
 - 13 selecting the highest-scoring partition;
 - 14 applying it to the plurality of feature points so as to create one or more sub-
 - 15 pluralities of feature points.

- 1 47. (Original) The method of claim 46, wherein the sub-pluralities of feature points are
- 2 used as sub-patterns by an image search method that is adapted to use pluralities of
- 3 feature points.

- 1 48. (Original) The method of claim 46, wherein the characteristics of each potential sub-pattern of each candidate partition include:
 - 3 area, number of feature points, and suitability of the sub-pattern for use with a
 - 4 particular search method.